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Teaching Meat Reduction: Insights from Multiple Intelligences Theory

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Abstract

Diet change toward eating less meat and more plant foods is advocated for reasons of health, environmental protection, and kindness toward non-human animals. This article is written for people who advocate meat reduction, regardless of whether their audiences are in schools, universities, organizations, or in the general public. However, the article may also be of interest to people who teach other content. Multiple Intelligences is an optimistic theory

which posits that people are intelligent in many ways and that people learn best when a wide variety of learning modes are deployed. The article begins by explaining Multiple Intelligences theory and its possible uses in education. The main part of the article makes suggestions for teaching meat reduction via a range of intelligences.

Keywords: meat reduction, multiple intelligences, student centered, plant based diets, diet change

Teaching Meat Reduction: Insights from Multiple Intelligences Theory

Perhaps the three most commonly heard reasons for eating less meat and more plant based food are that moving toward a plant based diet promotes human health, protects the environment, and shows kindness to our fellow animals. The evidence mounts every year of the urgency of these three reasons for diet change. For instance, research continues to show that still more lifestyle diseases, such as heart disease, diabetes, and dementia, are linked to diets high in animal products. On the environmental front, scientists who study the Earth are beginning to believe that we have entered a new geological era, the Anthropocene (Steffen, et al., 2011), in which human actions, including increased consumption of animal based foods, are now a major force, perhaps the major force, in planetary change, and this change is often for the worse. Last but not least, researchers who study non-human animals, including animals whom we use for food, continue to discover that these fellow animals do indeed have considerable intelligence and a considerable range of emotions.

Despite this evidence of the need to move away from meat and toward plant based diets, meat consumption continues to rise globally (Starke, 2011). Therefore, scientists, educators, and activists need to think carefully about the best ways to help the public understand and act on beneficial diet change. This article offers one educational tool:

Multiple Intelligences (MI) Theory (Gardner, 1993). The article begins by explaining MI Theory. Next, the theory's scientific basis is described. Then, general pointers are offered as to how to use MI in education. The article's final and longest section suggests ideas for applying MI specifically to teaching for meat reduction.

What Is Multiple Intelligence Theory?

The first intelligence test was used early in the 20th century (Terman, 1916). At that time, and for most of that century, intelligence was seen narrowly, focusing mostly on the abilities to use language, to calculate, and to think logically. While those abilities are certainly important, other important abilities were left out. In the last two decades of the 20th century, new, broader views of intelligence came to the fore. Perhaps the most prominent of these is Multiple Intelligences (MI) Theory (Gardner, 1993).

Whereas, traditional views of intelligence conceive of it as narrow and unchanging, MI sees intelligence as broad and capable of improvement. According to MI, everyone is smart but in different ways. Furthermore, everyone can become smarter in all the different intelligences. Thus, MI represents an optimistic view of education. There are no "dummies," only smart students who are smart in varied ways.

To date, Gardner (1999) has identified eight intelligences: verbal/linguistic, logical/mathematical, interpersonal, intrapersonal, naturalist, bodily/kinesthetic, visual/spatial, and musical/rhythmic. It should be noted that other scholars have classified intelligences in other ways. For instance, Sternberg (1985) developed the Triarchic Theory of Intelligence, which divides intelligences into componential, experiential, and practical.
In Table 1, each of the eight intelligences suggested by Gardner is briefly described. Appendix 1 offers a self-administered informal instrument, adapted from Armstrong (2009), by which people can obtain some indication of their intelligence profile.

Intelligence	Abilities	Possible Careers	Famous People

Verbal/Linguistic	Writing essays and speeches, learning new languages, playing word games, reading	Journalist, editor, lawyer, comedian	Shakespeare, Martin Luther King, Jr
Logical/Mathematical	Doing mathematical operations, analyzing cause and effect relations, solving problems and mysteries	Accountant, banker, detective, physician	Albert Einstein, Stephen Hawking
Interpersonal	Leading, teaching, making friends, understanding others	Teacher, politician, social worker, comedian	Sigmund Freud, Mao Zedong
Intrapersonal	Understanding one's own strengths and weaknesses, exercising self discipline, deciding based on one's own beliefs and values	Actor, philosopher, entrepreneur, religious leader	Confucius, Helen Keller
Naturalist	Recognizing patterns in natural and human made environments, noticing similarities	Botanist, environmental activist, shoe expert, nature guide	Charles Darwin, Jane Goodall

	and differences, keenly observing, enjoying being in natural setting, empathizing with nature		
Bodily/Kinesthetic	Doing things with one's hands, being well coordinating, copying gestures and mannerisms of others, taking things apart and reassembling them	Athlete, firefighter, surgeon, dance instructor	Lionel Messi, Michael Jordan
Visual/Spatial	Navigating, designing, visualizing, decorating	Architect, clothing designer, pilot, film animator	I.M. Pei, Pablo Picasso
Musical/Rhythmic	Distinguishing the qualities of sounds, playing musical instruments or singing, remembering tunes	Dancer, musician, speech pathologist, recording engineer	Beyonce Knowles, Michael Jackson

Table 1 – Background information on the eight intelligences identified by Gardner

A few points in Table 1 might need further explanation. One, intelligences are more than just abilities; they are also proclivities, i.e., how people like to learn, what they like in their surroundings. Two, naturalist intelligence is not only about nature; the skills of naturalists in noticing patterns, keenly observing, and identifying similarities and differences can be applied to the human made world, e.g., to the selecting which shoes to sell at a department store. Three, almost any career or activity will involve more than one intelligence, e.g., many intelligences might be useful to comedians, such as verbal/linguistic, interpersonal, bodily/kinesthetic, logical/mathematical, and musical/rhythmic.

The Scientific Basis of Multiple Intelligences Theory

This section of the paper describes the criteria that Gardner used to define an intelligence. However, for many educators and others, the idea that there are multiple ways to be smart and to succeed in life just makes intuitive sense based on their observations of their students, their family and friends, and themselves. For instance, some people do poorly in school but seem to succeed in life, perhaps due to inter- and/or intrapersonal intelligences, whereas others who excelled in school seem to score poorly in the "tests" of life they encounter outside of academia. Thus, even without scientific evidence, MI Theory has appealed to many education stakeholders because it matches their own experiences as educators and as members of the general public (Kornhaber, 2001).

Gardner developed eight criteria for deciding what constitutes an intelligence (Armstrong, 2009). Table 2 presents these criteria. It should be noted that not all scholars agree with these criteria (e.g., Kincheloe, 2004). Gardner himself (1983) acknowledged that deciding what is or is not an intelligence was an exercise, "reminiscent more of an artistic judgment than of a scientific assessment" (p. 62). Other than the eight intelligences listed above, Gardner has considered other intelligences but to date has not included them (Gardner, 2009). These other intelligences include spiritual, existential, and moral.

Criteria	Explanation of the Criteria
Potential isolation by brain damage	Some people are not able to deploy this ability due to an accident or the effects of disease, e.g., damage to Broca's area (left frontal lobe) might impair verbal/linguistic intelligence.
Existence of idiot savants, prodigies, and other exceptional individuals	Some people are very high in this ability e.g., the real life autistic savant high in logical/mathematical intelligence, upon whom Dustin Hoffman's character in the film *Rain Man* is based.
An identifiable core operation or set of operations	People high in musical/rhythmic intelligence are likely to be talented in such areas as harmony, timbre, melody and rhythm.
A distinctive development history, along with a definable set of 'end-state' performances	People experience a developmental process as their ability progresses, and those very high in a particular intelligence produce great works, e.g., great works of art.
An evolutionary history and evolutionary plausibility	Use of the intelligence in humans has developed over time, and the intelligence may even be seen in other animals.
Support from experimental psychological tasks	The intelligence can be isolated and explored by researchers via the use of specific tasks, such as people who are very good at remembering words but not good at

	remembering faces.
Support from psychometric findings	The intelligence can be measured by standardized tests developed by psychologists.
Susceptibility to encoding in a symbol system	Examples of symbol systems include written language and musical notation

Table 2. Gardner's criteria for deciding what constitutes an intelligence (Gardner, 1983, pp. 62-69).

General Pointers on Applying MI to Education

MI Theory was not developed to be used as a guide to pedagogy; however, many educators have drawn implications for teaching and learning (Armstrong, 2009). Some of these implications are summarized as ten Yeses and Nos.

1. Yes – Ask "How are students smart?" This is the Growth Paradigm, because it suggests that all students have the capacity to grow their learning.

No – Do not ask "Are students smart?". This is the Deficit Paradigm, which focuses on what students cannot do, instead of what they can do. According to MI theory, all students are smart but in different ways.

2. Yes – All eight intelligences should be included in teaching.

No – It is not necessary to include all eight intelligences in every lesson. Traditionally, formal education has focussed on only verbal/linguistic and logical/mathematic intelligences. This focus disadvantages students who are relatively low in these two intelligences.

3. Yes – MI is about abilities.

No – MI is not only about abilities; it is also about preferences, about how students prefer to learn. For instance, a student might be relatively low in musical/rhythmic intelligence, but still enjoy lessons that involve music.

4. Yes – Students may be more motivated to learn and may also learn better when the way a lesson is taught matches the way they like to learn.

No – Students should not be segregated into classes based on their intelligence profiles, e.g., it would not be a good idea to have one class of students high in visual/spatial intelligence but relatively low in verbal linguistic intelligence who are taught mostly via visuals and seldom read. In addition to broadening teaching methods so that every student sometimes learns in ways that fit their strengths, MI also has the goal that students will grow stronger in intelligences in which they are relatively weak, as intelligence is not fixed, and students can increase in all intelligences.

5. Yes – MI activities should often be done in groups, so that students can benefit from each other's different strengths. Indeed, multiple ability tasks (Cohen, 1994), i.e., tasks involving a range of intelligences, e.g., writing, drawing, group interaction, and personal reflection, should be used. Such tasks may equalize the status of group member, i.e., teaching has traditionally focused on only two intelligences – verbal/linguistic and logical/mathematical – and, as a result, students high in those two intelligences have been the "stars" of their groups, the ones helping group mates. In contrast, students relatively lower in those two intelligences have been relegated to the group members who have little to contribute and who need to ask for help. By encouraging students to deploy a range of intelligences, multiple ability tasks provide a chance to equalize the status of group members, with those students relatively high in less academically highlighted intelligences having opportunities to play more central roles, including roles in which they help their peers.

No – Students who are highest in a particular intelligence, e.g., visual/spatial intelligence, should not do the part of the task involving that intelligence; instead, they should coach their group mates on that part. For instance, if drawing is part of the task, the group member best at drawing should coach their group mates in drawing.

6. Yes – Using MI brings in a wider range of intelligences, especially including those less valued in traditional education. This greater inclusion helps all students learn, enjoy learning, and develop all their intelligences.

No – In many societies, the intelligences are not considered equal. For instance, in many countries, admission to most university programs depends largely on verbal/linguistic and logical/mathematical intelligences. Fortunately, the intelligences complement each other. Thus, by learning a concept or skill via a number of intelligences, students deepen their understanding, e.g., learning done via bodily /kinesthetic intelligence can be displayed on an exam or in an essay that requires verbal/linguistic intelligence.

7. Yes – Multiple ability tasks may often make learning more fun, both due to the greater range of activities and for the inclusion of activities often viewed as non-academic and fun, such as miming, singing, drawing, and dancing.

No – For MI to become a frequent part of the curriculum, MI activities must not involve only content and skills viewed as trivial. Otherwise, MI may be seen by administrators, parents, and other stakeholders, even including students, as frivolous. Important content and skills must be covered.

8. Yes – Teaching via MI can, at least initially, mean more work for teachers, as new materials and activities need to be conceived and produced.

No – Using MI need not be more time consuming than other approaches to teaching. Firstly, teachers can work together and share ideas and materials. Secondly, students can also be materials developers . For instance, after teachers have given examples of how to do the technique Music as Content Carrier (Jensen, 2005), in which students put new words to familiar songs, students can create their own songs with the content being studied.

9. Yes – Students should learn about MI and should be encouraged to appreciate the benefits of working with people with a range of intelligence profiles.

No – Students need not take tests to measure their intelligence profiles. Instead, informal observation and inventories should suffice.

10. Yes – Everyone has their unique MI profile

No – It is more complicated than just the eight intelligences, because each intelligence has different facets. For instance, someone might be relatively high in musical/rhythmic intelligence and good at singing, but not very good at playing the erhu, a Chinese stringed instrument.

11. Yes – Using a wide range of intelligences will be new to many teachers, especially teachers of upper elementary and older students.

No – MI is not new, as teaching via a wide range of modes has been done for many years, especially with preschool and early elementary students. Furthermore, use of MI inspired techniques fits well as part of an overall student centered approach (Farrell & Jacobs, 2010; Jacobs & Farrell, 2001) to education which encourages students to be active, collaborative self-regulating learners with whom assessment takes place via multiple modes.

Using Multiple Intelligences To Teach Meat Reduction

Intelligences, according to Gardner (1999), can be used for constructive or destructive purposes. Thus, for example, teaching informed by MI can be used to promote healthy or unhealthy diets, environmentally friendly or unfriendly practices, kindness toward non-human animals or factory farming (Suddath, 2010). Indeed, this is the case with most teaching strategies; they are generic strategies, with curriculum developers, teachers, and students supplying the content.

This section of the paper offers suggestions on how MI can be used to teach meat reduction. Many books and websites offer further suggestions about general ideas for using

MI in teaching (e.g., Armstrong, 2009, n.d.; Bellanca, 2009; Lazear, 2003, Loh & Jacobs, 2003). Suggestions will be offered for each of the eight intelligences, bearing in mind that any activity involves more than one intelligence. Furthermore, activities that readers of this article already use can be enhanced by inclusion of additional intelligences, e.g., reading (verbal/linguistic intelligence) a brochure about factory farming can be supplemented by drawing (visual/spatial intelligence) about what was read or writing a fictional story (a different facet of verbal/linguistic intelligence) based in part on what was learned from the brochure. Most of the suggestions presented here are general ones which can be adapted to fit different content and different curricula, as well as different students, based on their ages, interests, needs, and academic levels.

Verbal/Linguistic Intelligence

Please recall that verbal/linguistic intelligence is one of the two intelligences most commonly used in traditional education. Thus, teachers and students are familiar with many ways of deploying this intelligence, including reading materials, writing reports, listening to tasks, and speaking while doing presentations. In this subsection, three perhaps lesser known ideas are presented.

Dialogic Reading. Reading aloud by teachers is a traditional teaching technique that can be used with students of all ages (Jacobs & Loh, 2001) and can be used with both fiction and non-fiction. Dialogic Reading (Doyle & Bramwell, 2006) increases the interactive element and the thinking skills element when teachers read aloud. In a typical read aloud session, only a small number of students (those called on by the teacher) have opportunities to talk, and many of the questions teachers ask deal with comprehension and memory. Dialogic Reading attempts to generate dialog in response to what is being read. This response can be between students and teachers, as well as between students. The topics discussed go beyond the details of the book and include students' experiences, emotional reactions, beliefs

and connections to their own lives. Fortunately, many books and other reading materials deal with themes related to diet and its impact on health, the environment, and our fellow animals.

SUMMER. Educational psychologists study how people learn, and based on this, various teaching techniques have been developed (e.g., Hythecker, Dansereau, & Rocklin, 1988). One such technique has come to be known as SUMMER (Jacobs, Power, & Loh, 2002). The steps in the dyadic SUMMER technique are:

S = **S**et the mood = A bit of chit-chat between the two partners before starting, in order to set a relaxed mood and to make sure everyone knows the procedure.

U = **U**nderstand a section of the text by reading the section silently = the text (usually non-fiction) has been divided into sections and each member of the twosome reads the same section alone.

M = **M**ention the main ideas = One student summarizes the section without looking at the page. The point here is to focus on only the main ideas.

M = **M**onitor the summary = The other partner checks the summary for accuracy and conciseness. Roles rotate for the next section of the reading material.

E = **E**laboration = A wide range of ways can be used by students to add their own input and build on what they are reading. These ways include:

- Connections to previous readings, viewings, and experiences
- Applications, i.e., how to use the information and ideas in the section
- Questions, i.e., ideas and terms the students did not understand or about which they want to know more
- Additions to what was read, e.g., information that the students know but that was not included in the reading, as well as predictions
- Agreements and disagreements with the ideas in the section
- Reactions, such as surprise, happiness, and disappointment

- Changing contexts, e.g., how the same situation might be different in different places, different times, or if different individuals, plants, and objects were involved.

Stories. Stories, whether real or invented, make a special connection to the human brain that facts seem less able to achieve (Scott, Hartling, & Klassen, 2009). Teachers and students can use stories many ways to address issues related to meat consumption. For instance, students can tell and/or write stories about their real life experiences with attempting to change their diets and the reactions these changes prompted in others and themselves. Before asking students to tell their own stories, teachers may want to demonstrate in order to give students a model, as to such matters as speaking style, use of tenses, and how to construct a story in a way that shows rather than tells. For instance, instead of saying that the hens suffered in their cages, the storyteller can paint a word picture that shows the suffering, such as describing the crowded conditions in the cages, the acrid smell of the air, and the lack of natural behaviors by the hens.

Logical/Mathematical Intelligence

The other intelligence most commonly valued in traditional education is logical/mathematical intelligence. This intelligence involves not only mathematics, but also reasoning, such as understanding cause and effect. This subsection describes three means of deploying logical/mathematical intelligence to help students understand the advantages of eating more plant foods.

Calculations. Any mode of calculation, e.g., addition or algebra, can be used to help students better understand the dangers of meat consumption. The numbers used to do these calculations can be drawn from the internet, such as data on patterns of meat consumption worldwide, or students can collect their own data, such as about their own diets. Furthermore, these data collection methods can be combined. For instance, with data on how many trees are saved by switching to a vegetarian diet, students can calculate how many trees they can

save in a month if they set aside one day a week for eating a plant based diet. Another source of data provides numbers on different f animals who are killed for meat (ADAPTT, 2013).

One point to note is that on the same issue, e.g., how many kilograms of plant food are needed to produce one kilogram of meat, students can find widely varying data. These discrepancies provide opportunities to help students become critical consumers of information (Cottrell, 2011). Advocates for meat reduction should resist the temptation to use only those data that most strongly support their arguments.

Hypothetical questions. Piaget, a famous scholar of cognitive and emotional development, and his colleagues (Piaget & Inhelder, 1973) proposed that the highest level of cognitive development was what they called Formal Operations. Formal operations involve the ability to do deductive and hypothetical reasoning, and to deal with abstract concepts beyond current reality. One way of helping students increase their ability to engage in formal operations is to ask them hypothetical questions and to encourage them to create such questions of their own. Hypothetical questions do not have one right answer, but the quality of answers can still be judged, by examining the reasoning and information used in the answers. Some ways of creating hypothetical questions involve:

- Change of Scale - What if people shrink to the size of ants?
- Change of Place - What if beings come from another galaxy and start to eat humans?
- Metamorphosis – What if climate change causes some species to evolve in unexpected ways?
- Substitution - What if your best friend has the face of Mickey Mouse?
- Changes from normal – What is melting polar ice causes ocean levels to rise?
- New inventions – What if people do not need to eat any more and can live healthfully just by taking a few pills?

Conducting experiments. Experiments help researchers understand cause and effect relationships, another facet of logical/mathematical intelligence. Students can learn to conduct their own studies in both the physical and social sciences. Conducting an experiment involves not only careful attention to the design and conduct of the study, but also careful thought in analyzing the study's results. For example, students can think of ways to educate school mates and others about the negative health effects of meat; then, students can measure if their school mates learned from these education efforts and whether the school mates changed their diets based on this learning.

Interpersonal Intelligence

Interpersonal intelligence involves such activities as understanding others, working with others, and persuading others. This subsection of the paper presents three ideas that may be useful in deploying interpersonal intelligence to help students appreciate the importance of meat reduction.

Positive interdependence. Humans share the planet not only with more than seven billion of our own species but also with many, many other animals. What attitudes do students have towards these other human and non-human animals? One source of insight into this question comes from Social Interdependence Theory (Johnson & Johnson, 2006). One way to think of interdependence is in terms of perceived correlations. People feel positively interdependent with others when they perceive that their outcomes are positively correlated, i.e., what helps one helps the others, but what hurts one hurts the others. Negative interdependence is the opposite, i.e., the outcomes are seen as negatively correlated, such that people believe that what helps others is detrimental to themselves, and whatever is of detriment to others is beneficial o themselves. Finally, people feel no interdependence toward others when they see no correlation between their own outcomes and those of the others.

A key goal of education lies in helping students appreciate the positive interdependence that exists between themselves and their fellow humans and other animals. For instance, if people eat more plant foods, they will be healthier, which will benefit society generally in terms of reduced health care costs, higher productivity, and greater happiness. If humans eat fewer of our fellow animals, the animals will benefit by enjoying longer, more natural lives, and humans will benefit, as mentioned in the previous sentence, owing to enhanced health.

Persuasion. People high in interpersonal intelligence excel at "putting themselves in others' shoes." This insight enables them to understand which points will be most successful in convincing people to reduce their meat consumption. For instance, increasing longevity may matter less to teenagers than to senior citizens. Students can better understand others and deploy their interpersonal intelligence by doing interviews, surveys, etc., so as to even better persuade people to eat more plant foods. The internet provides many venues for attempting to persuade others, e.g., responding to blogs or posting on Facebook or Instagram.

Social skills. Please remember that one of the optimistic features of MI Theory the view that everyone can improve in all the intelligences. One way that people can grow their interpersonal intelligence involves improving the quality and quantity of their use of social skills. Among the many, many social skills, several of the skills that can be especially useful when working with others are described in Table 3.

Social Skill	Why the Skill Is Important	Non-Verbal Elements	Words and Phrases
Thanking others	Promotes a polite atmosphere	Smile	"Thanks" "I appreciate … ". (details)
Praising others	Encourages greater	Thumbs up	"That was very good

	participation		when you …" (details)
Asking for reasons	Encourages deeper thinking	Palms facing up	"Why do you say do that?"
Asking for clarification	Values everyone's ideas; promotes clarity	Puzzled look	"Could you please explain?" "How do you spell that?
Highlighting other perspectives	Helps the group see matters more broadly	Hands held fairly far apart	"People from (background X) may see things differently."
Commenting on group functioning	Emphasizes the need for groups to work well	Smile	"Our group might be even more effective if we …"
Making suggestions	Improves each person's and the group's learning	Uncertain look	"How about if you …?"
Disagreeing politely	Helps the members and the group to see errors	Relaxed posture	"I'm not sure if I completely agree. In my opinion …"

Intrapersonal Intelligence

Characteristics that tend to be found among people high in intrapersonal intelligence include a desire to be independent and to have some time alone, possession of a strong will,

the ability to accurately describe their strengths and weaknesses as well as to learn from mistakes, and an interest in reflecting on their thoughts, feelings, and actions. This subsection of the paper presents three ideas for using intrapersonal intelligence to help students appreciate the importance of meat reduction.

Goals. Setting and achieving doable goals fits with intrapersonal intelligence. To help students build and utilize this ability, they need opportunities to consider what constitutes doable goals, to formulate such goals, to make plans for achieving their goals, and to exercise the discipline necessary to stick with those plans. An example of setting goals could be in relation to diet change toward greater consumption of plant foods. Students could plan what foods to buy (perhaps with their families), how to prepare the foods in a healthful manner, and when eating out, where to go, what to order, and how to inform the eatery about any special requests.

Choices. Many students seem to want their teachers to do all the choosing for them, e.g., what topics to write about or what to focus on in their projects. However, the ability and the desire to make their own choices are key to students mobilizing and developing their intrapersonal intelligence. Students can make choices in many areas, including what books or web materials to read, what topics to speak on, where to go on a field trip, and how assessment will be done. Often student choice takes the form of a negotiation with their teachers and classmates, in which all parties explain the reasoning behind their views. Yet another area for choice involves students' right to express their own opinions and to act in conformity with those opinions. For instance, if a small group of students, or even one student, believe that the best diets for them feature large amounts of meat, students should be able to follow that diet and to attempt to persuade others to join them.

Dialogue Journals. An excellent tool for reflection and introspection involves the use of dialogue journals (Horton, 2012). While dialogue journals can be done in many ways,

students generally have a special notebook (or create a folder in their computer or online) for their journal entries. Entries can be on one class-wide topic, with everyone, perhaps including the teacher, writing on that topic. Alternatively, each student can choose their own topic. Journal entries can be read by teachers, as well as peers, who give feedback on ideas, not on such matters as grammar or punctuation. In this way, dialogue journals combine opportunities to work alone with opportunities to communicate with others. Entries can cover such areas as students' thoughts on what the class has been discussing, students' reaction to class activities, and students' reflections on how class topics connect to their own lives, e.g., their reflections on the connection between humans and other animals.

Naturalist Intelligence

Characteristics associated with naturalist intelligence include a desire to spend time with plants and animals including a concern for their well being, a keenness to observe carefully and to draw insights from those observations, and an ability to identify similarities and differences and, based on that identification, to do classifications and construct taxonomies. A frequent point of confusion lies in the fact that the characteristics of naturalist intelligence can be applied not only to the natural world but also to the world of human made objects. This subsection of the paper presents three ideas for using naturalist intelligence to help students appreciate why they might want to eat more plant foods.

The Intelligence and Emotions of Our Fellow Animals. Research evidence continues to grow that non-humans animals are indeed intelligent and do display emotions, ranging from fear to empathy ("Animals Know," 2013; BBC, 2009; CIWF, 2006). The organization Compassion in World Farming has compiled an extensive bibliography of scientific works on this area: http://www.ciwf.org.uk/animal_sentience/default.aspx.

Clearly, the intelligences of other animals are not the same as those of humans, but then our needs differ. Indeed, Gardner defined intelligences as the "ability to solve problems

or fashion products that are of consequence in a particular cultural setting or community" *(*1993, p. 15). Other animals face somewhat different problems and live in different cultural settings; thus, their intelligence profiles should differ, but different need not mean an absence of intelligence or an inferior set of intelligences.

Nature activities. The Senegalese poet, Baba Dioum (1968), wrote that:

In the end, we conserve only what we love.

We will love only what we understand.

We will understand only what we are taught.

As environmental conservation constitutes a key reason to reduce meat consumption, educators face the challenge of finding ways to help students love nature by teaching them about nature. Fortunately, even in urban settings, nature areas, such as parks, often exist. Unfortunately, many people, even children, prefer shopping to spending time in natural settings. Thus, environmental education must expand beyond teaching about nature to include teaching *in* nature. Hikes provide one way to teach in nature. While hiking, students can come to understand the interdependent web of life, a web that is being destroyed by human intervention, with meat production constituting a major form of intervention, e.g., the raising of livestock accounts for as much as 18% of all human produced greenhouse gases (FAO, 2013).

Food preparation. Among the facets of naturalist intelligence are the abilities to keenly observe and to classify what has been observed. Most people enjoy food; thus, food preparation and especially food eating are likely to be popular activities. Here, the five senses can all be enlisted in observing the various tastes, sights, smells, textures, and even sounds of food. Then, foods can be classified based on those observations. For example, using the sense of sight, foods can be classified in terms of colors. Indeed, many health experts advice that a

healthful diet consists of a rainbow of differently colored plant foods (e.g., Australian Capital Territory government, n.d.).

Bodily/Kinesthetic Intelligence

Characteristics associated with bodily/kinesthetic intelligence include ability in athletic endeavors, enjoyment of movement, the capability to mimic the movements of others, and skill at working with one's hands. This subsection of the paper presents three ideas that may be useful in helping students appreciate the importance of meat reduction via bodily/kinesthetic intelligence.

Kinesthetic symbols. Kinesthetics is the science of movement. Kinesthetic symbols use gestures to represent key concepts. For example, to help students remember key reasons for meat reduction, such as health, environment, and kindness toward non-human animals, students can develop a kinesthetic symbol for each reason, e.g., students could represent health by flexing the bicep muscles in their arms; students could represent the environment by moving their hands to mimic the shape of a tree, starting with the trunk and then widening to represent the crown of the tree, i.e., the branches and leaves; and students could represent kindness by first imitating chickens flapping their wings and then placing their right hands over their hearts to represent empathy.

ST4. Students often spend most to class time sitting. Such sedentary behavior does not produce a conducive learning environment for students who enjoy exercising their bodily/kinesthetic intelligence, and sitting for long periods of time probably impairs the health of all students (Van Uffelen, et al., 2010). Perhaps the simplest way to provide an occasional break from sedentary classroom activities involves students standing while they discuss and compare their ideas. ST4 offers one means of doing that. The steps follow:

1. STand – everyone stands.

2. STir – students walk around on their own, without their usual groupmates or classroom neighbors.
3. STop – on a pre-arrange signal, students stop walking and pair with the student who is now nearest to them.
4. STate – students state their ideas, experiences, reactions, answers, questions, etc. to their new partner.

Laughter. Laughing gets students' bodies moving. Research suggests that laughter may have many physiological and psychological benefits (Mora-Ripoll, 2011). (Perhaps surprisingly, these benefits may be obtained even by simulated laughter.) Kataria (2011) is often credited with being the key person in developing ways to encourage people, usually in groups, to engage in laughter activities. Teachers and students can learn to lead classes and groups in doing laughter as a preface to focusing on more serious matters, such as the difficult task of changing one's own and others' diets. Last but not least, some evidence suggests that humans may not the only animals who laugh (Panksepp, 2005).

Visual/Spatial Intelligence

Characteristics associated with visual/spatial intelligence include a preference for seeing ideas represented visually, the ability to visualize, and enjoyment of maps, along with a good sense of direction. This subsection of the paper presents three ideas that deploy visual/spatial intelligence to help students appreciate the importance of meat reduction.

Drawing. MI offers students many ways to represent and develop their understanding. Drawing appeals to many students and can supplement and enliven words. For example, one time, the author of this article talked to upper primary school students about the contrasting lives of free ranging chickens and chickens confined on factory farms. Afterwards, the students did drawings to represent that contrast and wrote about the differences they had depicted.

Visualizations. Visualization involves people forming pictures or making movies in their minds to imagine different situations. For example, visualization has been used to help basketball players improve their free throw shooting (Hall & Erffmeyer, 1983). Visualizations can be conducted in many ways, including guided visualizations in which teachers or others read aloud from a detailed script while students close their eyes and form images of what they are hearing. For instance, visualizations could be done for processes in the body, such as digestion. After visualizations, students can draw to represent what they saw or watch videos of the same processes and compare what is on the videos with what they saw in their minds.

Student-made photos and videos. With the increase in the use of media in education, visual/spatial intelligence has become easier to deploy in teaching why people should increase the percentage of plant foods in their diets. For instance, the internet offers many relevant videos, such as those showing the horrible treatment of our fellow animals on factory farms and in slaughterhouses. Furthermore, learners can make and upload their own video productions. Indeed, taking photos and making videos is becoming increasingly easy, as is sharing those photos and videos with people almost anywhere. Thus, students can add these and other visuals to projects and other activities they do. For instance, students can find or develop healthy, easy to prepare recipes, photograph the ingredients and the places the ingredients can be purchased, and make videos of themselves preparing the dishes, including explaining any particular skills needed, such as the most efficient ways to cut mangoes.

Musical/Rhythmic Intelligence

Characteristics associated with musical/rhythmic intelligence include ability in singing, playing musical instruments, remembering melodies, keeping time to music, and recognizing tones. This subsection of the paper presents three musical/rhythmic ideas that can be deployed to help students appreciate the importance of meat reduction.

Songs, chants, poems, raps, etc. With the growing awareness of the advantages of moving toward plant based diets, more musicians, poets, and other artists are creating works that promote meat reduction. These can be used to inspire students and to encourage them to reflect on their own eating habits. Furthermore, students can create their own works, via the Music as Content Carrier technique (Jensen, 2005) explained previously.

Background music at talks/events. Even students who are relatively low in musical/rhythmic intelligence may enjoy music. Thus, by playing instrumental music before, during, and/or after activities may encourage students to engage more completely with the activities, although research finding differ (Halam, Price, & Katsarou, 2002). In addition to music, sounds from nature can also be played, such as the sounds of a rainforest (Clark & Button, 2011). In addition to a possible role in stress reduction (Tan, Yowler, Super, & Fratianne, 2012), nature sounds may also bring students' attention more easily to themes related to nature (Clark & Button, 2011).

Role plays. Role plays (Joyner & Young, 2006) are a well known but too little used teaching technique which can be deployed with almost any content. This technique gives students an opportunity to stand up, to move around, and to use gestures. Role plays are listed in the subsection of musical/rhythmic intelligence because musical/rhythmic intelligence can easily be integrated in role plays (as the performers may sing, recite poems, raps, etc.) Indeed, as with the other activities recommended in this section of the paper, role plays can combine various intelligences. For instance, depending on the role plays, in addition to bodily/kinesthetic and musical/rhythmic intelligences, other intelligences deployed might be interpersonal intelligence (as students work together to plan and perform the role play), verbal/linguistic intelligence (as students speak while planning and performing), and visual/spatial intelligence (as props and other visuals can be enliven the role plays). As has

been highlighted elsewhere in this paper, role plays and other MI inspired activities need to bring to life important curricular concepts and information.

Conclusion

In conclusion, the goal of this article has been to recommend that in all spheres – formal, non-formal, and informal – educators who promote a move away from meat consumption consider integrating ideas from Multiple Intelligences theory into their teaching. In this article, MI theory was explained, and for each of the eight intelligences currently put forward by Gardner, the originator of MI theory, three teaching ideas were explained, for a total of 24 teaching ideas.

MI theory offers a vision of a better future for the world, a vision of a world where all students feel confident that they can succeed, where everyone develops in a well rounded way and where all students are valued for the unique contributions they are capable of making. Envisioning a world in which plant based diets are the norm also presents an optimistic view of the future. Plant based diets play an important part in a research based vision of people enjoying longer, healthier lives and of a world where no one suffers from chronic hunger, because enough food reaches everyone. A vision of a world where plant based diets are the norm for humans also forms part of a hope for a future where humans have less of a negative environmental impact. Last but not least, when plant based diets become the norm, non-human animals will be able to live more natural lives, and humans will be able to enjoy delicious food without having to exploit many billions of our fellow animals.

Therefore, both MI theory and a move toward plant based diets present the promise of a better world. An MI approach to education empowers humans to reach our potentials , while improved diets empower us to move closer to our physical potential and closer to our potential as caring people, people who care for ourselves, for each other, for the planet, and

for our fellow animals. This blending of MI inspired pedagogy with life affirming education for meat reduction provides who means for educators to teach in a way consistent with the vision of the educational philosopher, John Dewey (cited in Archambault, 1964), who urged that, "There is no greater egoism than that of learning when it is treated simply as a mark of personal distinction to be held and cherished for its own sake. … [K]knowledge is a possession held in trust for the furthering of the well-being of all."

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Appendix 1

Multiple Intelligences Survey

Adapted from Thomas Armstrong's *Multiple Intelligences in the Classroom*, 2000, Association for Supervision and Curriculum Development, Alexandria, VA, USA.

The questions ask about your feelings and abilities in your native language/mother tongue. Usually, people answer either 1 or 0, but if you want, you can use .5 or other decimals.

Linguistic Intelligence:

I ...

___ write well and enjoy putting thoughts on paper (or in the computer).

___ enjoy telling stories or jokes.

___ can remember names, places, dates or trivia.

___ enjoy word games, e.g., Scrabble

___ enjoy reading books and magazines.

___ am a good speller.

___ enjoy nonsense rhymes, limericks, puns, etc.

___ enjoy listening to the spoken word.

___ have a good vocabulary.

___ enjoy communicating by talking or writing.

Total _____

Logical-Mathematical Intelligence:

I...

___ ask questions about how things work.

___ can do arithmetic problems in my head.

___ enjoy math classes.

___ enjoy math games, e.g., computer math games.

___ enjoy chess, checkers, or other strategy games.

___ enjoy logic puzzles or brainteasers.

___ feel more comfortable when something has been measured or quantified in some way.

___ believe almost everything has a logical explanation and like to analyze and understand situations.

___ am good at thinking on an abstract or conceptual level.

___ clearly see cause-effect relationships.

Total _____

Spatial Intelligence:

I ...

___ can visualize things clearly in my mind.

___ like maps, charts and diagrams better than words.

___ often daydream and/or have vivid dreams at night.

___ care about the décor (design, decorations, style) of rooms and buildings.

___ good at drawing things.

___ like movies, pictures and other visual presentations.

___ enjoy mazes and puzzles, e.g., Jigsaw puzzles.

___ have a good sense of direction.

___ frequently doodle or sketch.

___ enjoy creating designs on paper or by computer.

Total _____

Bodily-Kinesthetic Intelligence:

I ...

___ am good at sports.

___ find it difficult to sit still for long periods of time.

___ am good at mimicking others' gestures.

___ need to practice a new skill myself rather than reading about it or seeing someone else do it.

___ like touching/holding objects, moving them around, and working with my hands.

___ enjoy being on the go; running, jumping, moving.

___ like working with my hands, e.g., sewing, repairing, making things.

___ use many gestures when expressing myself.

___ am well-coordinated.

___ enjoy expressing myself through movement, e.g., dance.

Total _____

Musical Intelligence:

I ...

___ can distinguish among different sounds/tones.

___ remember melodies easily.

___ can carry a tune.

___ can play a musical instrument.

___ often hum, tap, or sing to myself while working or studying.

___ am sensitive to noises, e.g., rain, traffic.

___ like doing things in a rhythmic way.

___ can hear music in my head.

___ frequently listen to music on radio, CD, etc.

___ can keep time to a variety of music.

Total _____

Interpersonal Intelligence:

I ...

___ enjoy socializing

___ am a natural leader.

___ am a good listener when friends have problems.

___ make friends easily.

___ enjoy clubs, committees, and organizations.

___ like teaching things to others.

___ have many good friends and close acquaintances.

___ am good at seeing another person's point of view.

___ enjoy doing things in groups.

___ enjoy exchanging ideas with others.

Total _____

Intrapersonal Intelligence:

I ...

___ know how to set goals and reach them.

___ clearly know my strengths and weaknesses.

___ am comfortable with myself and enjoy my own company.

___ feel good about who I am and what I stand for.

___ would be described as someone who in well-organized and in control of situations.

___ stand up for my beliefs, regardless of what others say.

___ continually learn from my successes and failures.

___ am not much concerned about fads, fashion, or what is "in."

___ am always honest and up front about how I am feeling.

___ almost never feel bored or "down."

Total _____

Naturalist Intelligence

I...

___ have keen sensory skills - sight, sound, smell, taste, and touch - and notice things that others often miss.

___ protect the environment by recycling, reducing the amount I use, buying green products, trying to influence others.

___ like to be outside and activities like gardening, nature walks.

___ enjoy tv shows, videos, books about nature.

___ enjoy keeping scrapbooks and other collections of objects from nature.

___ like to record my observations, in writing, on video, etc.

___ recognize patterns, similarities, differences, anomalies.

___ easily learn characteristics, names, categorizations, and data about objects or species.

___ like to have pets and to grow plants.

___ enjoy learning about famous naturalists, e.g., Charles Darwin and Jane Goodall; and have considered such a career.

Total _____

Put Your Totals Here

Word Smart _____

Logic/Math Smart _____

Art/Space Smart _____

Body Smart _____

Music Smart _____

People Smart _____

Self Smart _____

Nature Smart _____

Use a Graph, Chart, Drawing, or Whatever to Represent Your Totals